

What is claimed is:

1. A frusto-conical interbody spinal fusion implant, comprising:
a body having an insertion end, a trailing end and an outer surface; and

bone engaging means for engaging said implant to adjacent vertebrae of the spine, the outer locus of said bone engaging means forming a substantially frusto-conical configuration, said implant being made of a material appropriate for human implantation.

2. The implant of claim 1 in which said body has a substantially frusto-conical configuration.

3. The implant of claim 1 in which said body has a substantially cylindrical configuration.

4. The spinal fusion implant of claim 1 in which said trailing end is larger than said insertion end.

5. The spinal fusion implant of claim 1 in which said insertion end is larger than said trailing end.

6. The spinal fusion implant of claim 1 in which said implant comprises a bone ingrowth material.

7. The spinal fusion implant of claim 1 in which said implant comprises a fusion promoting material.

8. The spinal fusion implant of claim 1 in which said implant is at least in part bioabsorbable.

9. The spinal fusion implant of claim 1 having a plurality of openings capable retaining fusion promoting material.

10. The spinal fusion implant of claim 1 in which said bone engaging means comprises said outer surface being porous at least

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A2 cont
in part.

11. The spinal fusion implant of claim 1 in which said bone engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

12. The spinal fusion implant of claim 11 in which said plurality of posts have a head portion and a stem portion, said head portion having a wider diameter than said stem portion.

13. The spinal fusion implant of claim 1 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

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14. The spinal fusion implant of claim 1 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

15. The spinal fusion implant of claim 14 in which said surface roughenings include a plurality of ratchetings.

16. The spinal fusion implant of claim 14 in which said surface roughenings include knurling.

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17. The spinal fusion implant of claim 1 in which said implant has an internal chamber and an access opening for accessing said internal chamber.

18. The spinal fusion implant of claim 17 in which said internal chamber is capable of containing fusion promoting material.

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A4
19. The spinal fusion implant of claim 17 in which said implant comprises a wall surrounding said internal chamber.

Sub cont
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20. The spinal fusion implant of claim 17 in which said wall has a plurality of openings passing therethrough in communication with said internal chamber.

21. The spinal fusion implant of claim 17 in which said implant has means for closing said access opening.

22. The spinal fusion implant of claim 1 in which said implant includes an engagement means for engaging instrumentation for the insertion of said implant.

23. The spinal fusion implant of claim 1 in which at least a portion of said outer surface comprises wells having at least partial walls.

24. The spinal fusion implant of claim 1 in which said implant is configured to be placed in close proximity in a side by side alignment to a second spinal fusion implant, said first and second implants when placed together having a combined overall width that is less than the sum of the individual maximum diameters of each of said first and second implants.

25. The spinal fusion implant of claim 1 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

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26. A frusto-conical interbody/spinal fusion implant, comprising:
a body having an insertion end, a trailing end and an outer surface; and

bone engaging means for engaging said implant to adjacent vertebrae of the spine, the locus of said bone engaging means forming a substantially cylindrical configuration, said implant being made of a material appropriate for human implantation.

27. The implant of claim 26 in which said body has a substantially

frusto-conical ~~configuration~~.

28. The implant of claim 26 in which said body has at least in part a cylindrical configuration.

29. The spinal fusion implant of claim 26 in which said trailing end is larger than said insertion end.

30. The spinal fusion implant of claim 26 in which said insertion end is larger than said trailing end.

31. The spinal fusion implant of claim 26 in which said implant comprises a bone ingrowth material.

32. The spinal fusion implant of claim 26 in which said implant comprises a fusion promoting material.

33. The spinal fusion implant of claim 26 in which said implant is at least in part bioabsorbable.

34. The spinal fusion implant of claim 26 having a plurality of openings capable retaining fusion promoting material.

35. The spinal fusion implant of claim 26 in which said bone engaging means comprises said outer surface being porous at least in part.

36. The spinal fusion implant of claim 26 in which said bone engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

37. The spinal fusion implant of claim 36 in which said plurality of posts have a head portion and a stem portion, said head portion having a wider diameter than said stem portion.

38. The spinal fusion implant of claim 26 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

Sub C5

39. The spinal fusion implant of claim 26 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

40. The spinal fusion implant of claim 39 in which said surface roughenings include a plurality of ratchetings.

41. The spinal fusion implant of claim 39 in which said surface roughenings include knurling.

Sub A7

42. The spinal fusion implant of claim 26 in which said implant has an internal chamber and an access opening for accessing said internal chamber.

43. The spinal fusion implant of claim 42 in which said internal chamber is capable of containing fusion promoting material.

Sub A8

44. The spinal fusion implant of claim 42 in which said implant comprises a wall surrounding said internal chamber.

45. The spinal fusion implant of claim 42 in which said wall has a plurality of openings passing therethrough in communication with said internal chamber.

Sub A9

47. The spinal fusion implant of claim 42 in which said implant has means for closing said access opening.

48. The spinal fusion implant of claim 26 in which one of said ends of said implant includes an engagement means for engaging

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instrumentation for the insertion of said implant.

49. The spinal fusion implant of claim 26 in which at least a portion of said outer surface comprises wells having at least partial walls.

50. The spinal fusion implant of claim 26 in which said implant is configured to be placed in close proximity in a side by side alignment to a second spinal fusion implant, said first and second implants when placed together having a combined overall width that is less than the sum of the individual maximum diameters of each of said first and second implants.

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51. The spinal fusion implant of claim 26 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

52. The spinal fusion implant of claim 51 in which said external thread has a thread height measured from said body which is greatest at said truncated side.

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53. A frusto-conical interbody spinal fusion implant, comprising:
a body having a substantially frusto-conical configuration, an insertion end, a trailing end and an outer surface; and
bone engaging means for engaging said implant to adjacent vertebrae of the spine, the outer locus of said bone engaging means forming a substantially frusto-conical configuration, said implant being made of a material appropriate for human implantation.

54. The spinal fusion implant of claim 53 in which said trailing end is larger than said insertion end.

55. The spinal fusion implant of claim 53 in which said insertion end is larger than said trailing end.

56. The spinal fusion implant of claim 53 in which said implant comprises a bone ingrowth material.

57. The spinal fusion implant of claim 53 in which said implant comprises a fusion promoting material.

58. The spinal fusion implant of claim 53 in which said implant is at least in part bioabsorbable.

Sub
Q12 59. The spinal fusion implant of claim 53 having a plurality of openings capable retaining fusion promoting material.

60. The spinal fusion implant of claim 53 in which said bone engaging means comprises said outer surface being porous at least in part.

61. The spinal fusion implant of claim 53 in which said bone engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

62. The spinal fusion implant of claim 61 in which said plurality of posts have a head portion and a stem portion, said head portion having a wider diameter than said stem portion.

63. The spinal fusion implant of claim 53 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

Sub C97 64. The spinal fusion implant of claim 53 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

65. The spinal fusion implant of claim 64 in which said surface

roughenings include a plurality of ratchetings.

66. The spinal fusion implant of claim 64 in which said surface roughenings include knurling.

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67. The spinal fusion implant of claim 53 in which said implant has an internal chamber and an access opening for accessing said internal chamber.

68. The spinal fusion implant of claim 67 in which said internal chamber is capable of containing fusion promoting material.

69. The spinal fusion implant of claim 67 in which said implant comprises a wall surrounding said internal chamber.

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Q14
70. The spinal fusion implant of claim 67 in which said wall has a plurality of openings passing therethrough in communication with said internal chamber.

71. The spinal fusion implant of claim 67 in which said implant has means for closing said access opening.

72. The spinal fusion implant of claim 53 in which one of said ends of said implant includes an engagement means for engaging instrumentation for the insertion of said implant.

73. The spinal fusion implant of claim 53 in which at least a portion of said outer surface comprises wells having at least partial walls.

74. The spinal fusion implant of claim 53 in which said implant is configured to be placed in close proximity in a side by side alignment to a second spinal fusion implant, said first and second implants when placed together having a combined overall width that is less than the sum of the individual maximum diameters of each of

said first and second implants.

Sub 95
75. The spinal fusion implant of claim 53 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

76. The spinal fusion implant of claim 75 in which said external thread has a thread height measured from said body which is greatest at said truncated side.

Sub 116
77. An interbody spinal fusion implant, comprising:
a body having a substantially cylindrical configuration, an insertion end, a trailing end and an outer surface; and
bone engaging means for engaging said implant to adjacent vertebrae of the spine, the locus of said bone engaging means forming a substantially cylindrical configuration, said implant being made of a material appropriate for human implantation.

78. The spinal fusion implant of claim 77 in which said implant comprises a bone ingrowth material.

79. The spinal fusion implant of claim 77 in which said implant comprises a fusion promoting material.

80. The spinal fusion implant of claim 77 in which said implant is at least in part bioabsorbable.

Sub 117
81. The spinal fusion implant of claim 77 having a plurality of openings capable retaining fusion promoting material.

82. The spinal fusion implant of claim 78 in which said bone engaging means comprises said outer surface being porous at least in part.

83. The spinal fusion implant of claim 78 in which said bone

engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

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84. The spinal fusion implant of claim 83 in which said plurality of posts have a head portion and a stem portion, said head portion having a wider diameter than said stem portion.

85. The spinal fusion implant of claim 78 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

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86. The spinal fusion implant of claim 78 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

87. The spinal fusion implant of claim 86 in which said surface roughenings include a plurality of ratchetings.

88. The spinal fusion implant of claim 86 in which said surface roughenings include knurling.

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89. The spinal fusion implant of claim 78 in which said implant has an internal chamber and an access opening for accessing said internal chamber.

90. The spinal fusion implant of claim 89 in which said internal chamber is capable of containing fusion promoting material.

91. The spinal fusion implant of claim 89 in which said implant comprises a wall surrounding said internal chamber.

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92. The spinal fusion implant of claim 89 in which said wall has a plurality of openings passing therethrough in communication with

said internal chamber.

93. The spinal fusion implant of claim 89 in which said implant has means for closing said access opening.

94. The spinal fusion implant of claim 78 in which one of said ends of said implant includes an engagement means for engaging instrumentation for the insertion of said implant.

95. The spinal fusion implant of claim 78 in which at least a portion of said outer surface comprises wells having at least partial walls.

96. The spinal fusion implant of claim 78 in which said implant is configured to be placed in close proximity in a side by side alignment to a second spinal fusion implant, said first and second implants when placed together having a combined overall width that is less than the sum of the individual maximum diameters of each of said first and second implants.

97. The spinal fusion implant of claim 78 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

98. A frusto-conical interbody spinal fusion implant, comprising:
a body having a substantially frusto-conical configuration, an insertion end, a trailing end and an outer surface; and
bone engaging means for engaging said implant to adjacent vertebrae of the spine, said implant being made of a material appropriate for human implantation.

99. The implant of claim 98 in which the outer locus of said bone engaging means forms a substantially frusto-conical configuration.

100. The implant of claim 98 in which said the outer locus of said

bone engaging means forms a substantially cylindrical configuration.

101. The spinal fusion implant of claim 98 in which said insertion end is larger than said trailing end.

Sub 23 102. The spinal fusion implant of claim 101 in which said insertion end comprises a tapered leading portion.

103. The spinal fusion implant of claim 98 in which said trailing end is larger than said insertion end.

104. The spinal fusion implant of claim 98 in which said implant comprises a bone ingrowth material.

105. The spinal fusion implant of claim 98 in which said implant comprises a fusion promoting material.

106. The spinal fusion implant of claim 98 in which said implant is at least in part bioabsorbable.

Sub 24 107. The spinal fusion implant of claim 98 having a plurality of openings capable retaining fusion promoting material.

108. The spinal fusion implant of claim 98 in which said bone engaging means comprises said outer surface being porous at least in part.

109. The spinal fusion implant of claim 98 in which said bone engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

110. The spinal fusion implant of claim 109 in which said plurality of posts have a head portion and a stem portion, said head portion having a wider diameter than said stem portion.

111. The spinal fusion implant of claim 98 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

Sub C11 112. The spinal fusion implant of claim 98 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

113. The spinal fusion implant of claim 112 in which said surface roughenings include a plurality of ratchetings.

114. The spinal fusion implant of claim 112 in which said surface roughenings include knurling.

Sub A25 115. The spinal fusion implant of claim 98 in which said implant has an internal chamber and an access opening for accessing said internal chamber.

116. The spinal fusion implant of claim 115 in which said internal chamber is capable of containing fusion promoting material.

Sub A26 117. The spinal fusion implant of claim 115 in which said implant comprises a wall surrounding said internal chamber.

Sub A27 118. The spinal fusion implant of claim 115 in which said wall has a plurality of openings passing therethrough in communication with said internal chamber.

119. The spinal fusion implant of claim 115 in which said implant has means for closing said access opening.

120. The spinal fusion implant of claim 98 in which one of said ends of said implant includes an engagement means for engaging

instrumentation for the insertion of said implant.

121. The spinal fusion implant of claim 98 in which at least a portion of said outer surface comprises wells having at least partial walls.

122. The spinal fusion implant of claim 98 in which said implant is configured to be placed in close proximity in a side by side alignment to a second spinal fusion implant, said first and second implants when placed together having a combined overall width that is less than the sum of the individual maximum diameters of each of said first and second implants.

Sub 287 123. The spinal fusion implant of claim 98 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

124. A frusto-conical interbody spinal fusion implant, comprising:
a body having an insertion end, a trailing end and an outer surface; and

bone engaging means for engaging said implant to adjacent vertebrae of the spine, the outer locus of said bone engaging means forming a substantially frusto-conical configuration substantially along a portion of said bone engaging means in contact with said adjacent vertebrae, said implant being made of a material appropriate for human implantation.

125. The implant of claim 124 in which said body has a substantially frusto-conical configuration substantially along a portion of said outer surface in contact with said adjacent vertebrae.

126. The implant of claim 124 in which said body has a substantially cylindrical configuration substantially along a portion of said outer surface in contact with said adjacent

vertebrae.

127. The spinal fusion implant of claim 124 in which said bone engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

128. The spinal fusion implant of claim 124 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

Sub C13 129. The spinal fusion implant of claim 124 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

Sub A29 130. The spinal fusion implant of claim 124 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

131. A spinal fusion implant, comprising:

a body having an outer locus larger than the space between two adjacent vertebrae to be fused, said outer locus being substantially cylindrical along a portion of said implant in contact with said adjacent vertebrae, and

bone engaging means for engaging said implant to said adjacent vertebrae of the spine on the exterior of said body, said implant being made of a material appropriate for human implantation.

132. The spinal fusion implant of claim 131 including a plurality of openings in the exterior surface of said implant.

133. The spinal fusion implant of claim 131 in which said bone engaging means comprises a plurality of posts spaced apart along at least a portion of the outer surface of said body.

134. The spinal fusion implant of claim 131 in which said bone engaging means comprises a mesh-like material having a plurality of interstices for receiving fusion promoting material.

Sub a³⁰ 135. The spinal fusion implant of claim 131 in which said bone engaging means includes a plurality of surface roughenings for engaging said adjacent vertebrae and for maintaining said implant in place, said surface roughenings being present on at least a portion of said outer surface of said implant.

136. The spinal fusion implant of claim 131 having a longitudinal central axis and at least one truncated side forming a planar surface parallel to said central axis.

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